

REMARKS

Claims 1-36 and 38-41 are pending in this application. Claim 1-36 and 38-41 are rejected in the outstanding Official Action.

Claims 1, 8, and 30 are amended above, and claim 42 is newly added. Claim 37 has previously been canceled without prejudice or disclaimer of the subject matter contained therein.

Support for the above amendments appears throughout the originally filed specification, claims, and drawings. Specifically, the claims are amended as follows.

Claim 1 has been amended to further clarify the subject matter thereof. The amendments are supported, *inter alia*, on page 9, lines 2 to 4, and Fig. 1C.

Claim 8 has been amended to independent form and is further supported *inter alia*, on page 9, lines 2 to 4, and Fig. 1C.

Claim 30 has been amended to further clarify the subject matter thereof. The amendments are supported, *inter alia*, on page 9, lines 2 to 4, Fig. 1C.

New claim 42 has been added, and is supported, *inter alia*, in Figs. 10A to 10C.

Applicants, by amending any claims herein, make no admission as to the validity of any rejection made by the Examiner against any claim. Applicants reserve the right to reassert any of the claims canceled or the original claim scope of any claim amended herein, in a continuing application.

It is respectfully submitted that the above amendments to the claims introduce no new matter within the meaning of 35 U.S.C. §132. Accordingly, Applicants request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

- I. Claims 1-36 and 38-41 stand rejected under 35 U.S.C. 112, second paragraph, as set forth in paragraph 1 on page 2 of the Official Action. The rejection is respectfully traversed.***

The claims have been amended in response thereto. Specifically, independent claims 1, 8, and 30 have been amended to remove the “main wing” language.

- II. Claims 1-4, 6-20, 36, 38, and 39 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (US 2,147,968) in view of Cox et al. (“Cox”, US 2003/0155463) and Kora Kit (released in 2002), as set forth in paragraph 5 beginning on page 3 of the Official Action.***

The Examiner asserts that “it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne a mini or micro UAV configured for flight in the Reynolds number range of between about 20,000 and 300,000 and between about 10 m/s to about 20 m/s, in view of the teachings of Cox et al. The motivation for doing so would have been to create an aircraft which can be handled in the battlefield (sizing of Cox et al.) yet has high load carrying capabilities and maneuverability (arrangement of Delanne).”

The Examiner further asserts that “it would have been obvious to one of ordinary skill in the art to resize the Delanne aircraft to be a scaled down size of the full size aircraft configured for flight in the Reynolds number range of between about 20,000 and 300,000

and between about 10 m/s to about 20 m/s in view of the teaching of the Kora Kit and to make the scale sized aircraft an unmanned [Radio Controlled] aerial vehicle. The motivation for doing so would have been to participate in the hobby of RC aircraft." These rejections are respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 1 is currently recited as follows:

*A self-propelled Micro UAV configured for aerodynamic flight at flight speeds in the range between about 10m/s to about 20 m/s at Reynolds numbers in the range between about 20,000 and about 300,000, and comprising a fore wing and an aft wing in tandem close-coupled arrangement, **wherein at least a majority of a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a positive gap, wherein an average value for said gap is less than a root***

chord of said fore wing, wherein said front wing is unconnected to said aft wing, wherein said aft wing has side panels and control surfaces on at least one of said aft wing and said side panels, and tapered planform with positive sweep, said fore wing has non-positive trailing edge sweep, the fore wing and aft wing being disposed at different heights, and said arrangement being free of additional wings or tail arrangement, wherein said Reynolds numbers are based on a characteristic chord length of one of said fore wing and said aft wing.

Claim 1 is now limited to Micro UAV's, and thus the Cox reference is **not** relevant. Applicants respectfully refer to item 28 of the Official Action in which while the Examiner refers to Cox disclosing an aircraft in the mini-UAV range, the Examiner does not raise a similar issue regarding the Micro-UAV range, and thus *de facto* agrees that Cox does not disclose nor relate to air vehicles in the Micro-UAV category.

Regarding the Kora Kit, this is a completely irrelevant citation. The Kora Kit is a plastic construction kit of the Libellula aircraft, and is designed and structured for the **express purpose of displaying the model as a static display model.** It is not a powered model, it is not meant to fly, nor can it fly. By being a geometrically scaled replica of the full scale aircraft, the intention is to replicate the geometrical shape of the wing aerofoil sections, but at a smaller scale wherein the linear dimensions are reduced pro-rata. In trying to fly such an aircraft at Reynolds numbers completely different to those of the full scale aircraft, and with the center of gravity of the model probably not in the appropriate place for flying purposes (as would be expected from a model display kit), the aerodynamic

performance would be expected to be extremely poor to say the least, as has been discussed in detail in the previously filed responses regarding scaling and Reynolds numbers.

One of ordinary skill in the art would not expect such a model to fly. Such models are not, as a rule, configured for enabling a motor to be installed, and in rare cases where a motor can be installed, it is for display purposes for turning the propeller with little power. Further, no motor that is large enough to provide the required power-to-weight ratio for flying can actually be installed in the model. It looks unlikely that the model kit is configured for allowing any deflection of "control surfaces", and certainly does not include nor can include suitable actuators for controlling the control surfaces, and thus cannot be controlled in flight, again rendering the kit unsuitable as a flying model. Furthermore, such plastic models are generally inherently unfit to fly from a structural viewpoint, are incapable of withstanding the stresses normally induced by flying, and would inevitably crash land and become severely damaged, rendering it incapable for its intended purpose, which is for a static display. Thus, there is no motivation for even attempting to fly such a plastic model.

Thus, and as has already been discussed in the response to previous Official Actions, it is clearly evident that starting with the Delanne aircraft and merely scaling down the size thereof would be expected to provide a miniaturized aircraft having the identical geometry as the full-scale aircraft, but with severely degraded performance to the extent of being unflyable. Thus, the scaled down Delanne aircraft would be ultimately unsuitable as an operating aircraft.

In contrast, the present invention provides a micro-UAV having significant performance (see for example page 6, line 22 to page 7, line 18 of the specification), and thus represents an unexpected result as compared with the cited prior art.

Furthermore, it is to be noted that according to claim 1, "said front wing is unconnected to said aft wing", and this is in contrast with the structure of the embodiment of Figs. 1 to 3 of Delanne in which the front wing is connected to the rear wing via the reinforcing element 8. It is to be noted that any motivation to make a radio controlled model of the Delanne aircraft to "*participate in the hobby of RC aircraft*" would require the scaled flying model to be visually very similar to Delanne, the more visually similar the better, and thus there would a strong motivation not to remove the "reinforcing element 8," which is a very prominent visual feature of the Delanne aircraft, in contrast to the claimed subject matter of claim 1.

Regarding the Examiner's comment in item 6 that "*at least some portion of the aircraft would have a characteristic length to calculate the Re in that range*" is moot, since the Reynolds number in claim 1 is specifically linked to the chord of one of the fore wing and the aft wing.

Claim 8 has now been amended to independent form, comprises all the features of claim 1, and is currently recited as follows:

A self-propelled Micro UAV configured for aerodynamic flight at flight speeds in the range between about 10m/s to about 20 m/s at Reynolds numbers in the range between about 20,000 and about 300,000, and comprising a fore wing and an aft wing in tandem close-coupled arrangement, wherein at least a majority of a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a positive gap, wherein an average value for said gap is less than a root chord of said fore wing, wherein said aft wing has side panels and control surfaces on at least one of said aft wing and said side panels, and tapered planform with positive sweep, said fore wing has non-positive trailing edge sweep, the fore wing and aft wing being disposed at different heights, and said arrangement being free of additional wings or tail arrangement, wherein said Reynolds numbers are based on a characteristic chord length of one of said fore wing and said aft wing, wherein said tandem arrangement of said fore wing and said aft wing has an overall width W and an overall length L including any control surfaces of said UAV, and the sum of planform wing areas of said tandem arrangement is at least 70% of the product $W \times L$.

As clearly stated in the claim, "at least a majority of a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a positive gap, wherein an average value for said gap is less than a root chord of said fore wing".

The combination of this feature and the feature that "*the sum of planform wing areas of said tandem arrangement is at least 70% of the product $W \times L$* " is simply not to be found or suggested in any of the configurations disclosed in Delanne.

While Figs. 4 and 6 are very poor illustrative drawings of an aircraft configuration, there is still nothing in this figures disclosing or suggesting the feature that "*at least a majority of a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a positive gap, wherein an average value for said gap is less than a root chord of said fore wing*". Rather the opposite. In the Examiner's own view as per item 30 of the Action, the wings in Figs. 6 and 8 **overlap** and thus there is no such gap. If the Examiner considers that these figures do show a positive gap for a majority of the trailing edge of the fore wing, and that the average gap is less than a root chord of the fore wing he is respectfully asked to indicate where.

Thus, nothing in Delanne, Cox, and Kora Kit, taken alone or in combination, render the subject matter of claims 1-4, 6-20, 36, 38, and 39 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

III. Claims 21, 22, 25, and 26 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (US 2,147,968) and Cox et al. ("Cox", US 2003/0155463) as applied to claim 1 above, and further in view of Cox '398 (US 6,626,398), as set forth in paragraph 17 on page 6 of the Official Action.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to apply dihedral, diverging fore and aft wings, and positive angle of incidence to the UAV of Delanne and Cox et al. described above and further in view of the teaching of Cox '398." This rejection is respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Delanne and **Cox** have been discussed in detail in the response set forth above in paragraph II. **Cox '398** is cited by the Examiner for the reasons set forth in Official Action. Cox '398 adds nothing relevant to Delanne and Cox regarding the base combination.

Thus, nothing in Delanne, Cox, and Cox '398, taken alone or in combination, render the subject matter of claims 21, 22, 25, and 26 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

IV. Claims 5, 23, 24, and 27-29 stand rejected under 35 USC § 103(a) as being unpatentable over Delanne (US 2,147,968) and Cox et al. ("Cox", US 2003/0155463) and Cox '398 as applied to claims 1 and 4 above, and further in view of Fraser (US 3,954,231), as set forth in paragraph 18 on page 6 of the Official Action.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to provide the aircraft arrangement of Delanne, Cox et al., and Cox '398 as described above with the pylon wing twist, and stability characteristics of Fraser. The motivation for doing so would have been to meet the flight requirements with respect to maneuverability and range for the UAV." This rejection is respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner

claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Delanne, Cox, and Cox '398 have been discussed in detail in the response set forth above in paragraphs II and III. **Fraser** is cited by the Examiner for the reasons set forth in the Official Action.

Fraser adds nothing relevant to Delanne, Cox, and Cox '398 regarding the base combination recited in claim 1.

Thus, nothing in Delanne, Cox, Cox '398, and Fraser, taken alone or in combination, render the subject matter of claims 5, 23, 24, and 27-29 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

V. *Claims 30, 31, 32, 34, 40, and 41 stand rejected under 35 USC § 103(a) as being unpatentable over the Miles Aircraft Libellula M.35 in view of Kora Kit, as set forth in paragraph 19 on page 7 of the Official Action.*

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to create a flying scale model (i.e. UAV) of the Miles Aircraft Libellula M.35 which is configured for flight in the Reynolds number range of between about 20,000 and 300,000 and between about 10 m/s to about 20 m/s, and where said Reynolds numbers being based on a characteristic chord length of a main wing of said UAV, said main wing being one of said fore wing and said aft wing. The motivation for doing so would have been to create a recreational or RC hobby aircraft." This rejection is respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 30 is currently recited as follows:

A self-propelled Micro UAV configured for aerodynamic flight at flight speeds in the range between about 10m/s to about 20 m/s at Reynolds numbers in the range between about 20,000 and about 300,000 and comprising a fore wing and an aft wing in tandem close-coupled arrangement, wherein a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a gap, wherein an average value for said gap is less than a root chord of said fore wing, wherein said aft wing has first side panels and control surfaces on at least one of said aft wing and said side panels, and tapered planform with positive sweep, said fore wing has non-positive trailing edge sweep, the fore and aft wing being disposed at different height, and said arrangement being free of additional wings or tail arrangement, wherein said Reynolds numbers

are based on a characteristic chord length of one of said fore wing and said aft wing, and wherein a planform area of the aft wing is not less than a planform area of the fore wing.

Thus, claim 30 includes the features:

- *wherein a trailing edge of said fore wing is spaced from a leading edge of said aft wing by a gap, wherein an average value for said gap is less than a root chord of said fore wing*
- *wherein a planform area of the aft wing is not less than a planform area of the fore wing*

It is clear that the Libellula aircraft does not disclose nor suggest the first feature - as clearly seen the minimum gap between the front wing and rear wing in the Libellula aircraft is larger than the chord of the front wing, and the average value of the gap is even greater. Thus this feature renders moot the Examiner's comments in item 31 of the Action. Regarding the second feature, all of the embodiments illustrated in Delanne show the fore wing larger than the aft wing.

Furthermore, regarding the combination with the Kora Kit, we refer to the comments regarding this kit as provided above, *mutatis mutandis*, and submit that this is an irrelevant citation, and even combining the kit with the Libellula reference would not result in a radio controlled kit.

Thus, nothing in the Miles Aircraft Libellula M.35 and Kora Kit, taken alone or in combination, render the subject matter of claims 30, 31, 32, 34, 40, and 41 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

VI. *Claim 33 stands rejected under 35 USC § 103(a) as being unpatentable over the Miles Aircraft Libellula M.35 in view of Kora Kit as applied to claim 30 above, and further in view of Warsop et al. ("Warsop", US 6,607,162) as set forth in paragraph 25 on page 9 of the Official Action.*

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to make the aircraft of Libellula M.35 and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15 cm in view of the teaching of Warsop et al. The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions." This rejection is respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even

if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Miles Aircraft Libellula M.35 and **Kora Kit** have been discussed in detail in the response set forth above in paragraph V. **Warsop** is cited by the Examiner for the reasons set forth in the Official Action.

Warsop adds nothing relevant to Miles Aircraft Libellula M.35 and Kora Kit regarding the base combination recited in claim 30.

Thus, nothing in Miles Aircraft Libellula M.35, Kora Kit, and Warsop, taken alone or in combination, render the subject matter of claim 33 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

VII. Claim 35 stands rejected under 35 USC § 103(a) as being unpatentable over Delanne in view of Cox et al. and Kora Kit as applied to claim 1 above, and further in view of Warsop et al., as set forth in paragraph 26 on page 9 of the Official Action.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to make the aircraft of Delanne and Cox et al. with a longitudinal length and a maximum wingspan not greater than about 15 cm in view of the teaching of Warsop et al. The motivation for doing so would have been to make the aircraft small and light; suitable for short efficient missions." This rejection is respectfully traversed.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Delanne, Cox, and Kora Kit have been discussed in detail in the response set forth above in paragraph II. **Warsop** is cited by the Examiner for the reasons set forth in the Official Action.

Warsop adds nothing relevant to Delanne, Cox, and Kora Kit regarding the base combination recited in claim 1.

Thus, nothing in Delanne, Cox, Kora Kit, and Warsop, taken alone or in combination, render the subject matter of claim 35 obvious within the meaning of 35 U.S.C. §103. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

CONCLUSION

Applicants believe that a full and complete response has been made to the pending Official Action and respectfully submit that all of the stated grounds for rejection have been overcome or rendered moot. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative at the number below to expedite prosecution.

If an extension of time is necessary to prevent abandonment of this application and is not filed herewith, then such extension of time is hereby petitioned for under 37 C.F.R. §1.136(a). Any fees required for further extensions of time and any fees for the net addition of claims are hereby authorized to be charged to our Deposit Account No. 14-0112. Prompt and favorable consideration of this reply is respectfully requested.

Respectfully submitted,
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